

Results of Directional Survey

API number:	30-025-40375		
OGRID:		Operator:	COG OPERATING LLC
		Property:	LIGHTNING P-38 STATE # 3H

surface	ULSTR:	Q (I)	01	T 21S	R 33E
				1980 FSL	330 FEL

BH Loc	ULSTR:	T (L)	01	T 21S	R 33E
15279 MD		10780.7	TVD	1951 FSL	317 FWL
					4963 FEL

Top Perf/OH	ULSTR:	Q (I)	01	T 21S	R 33E
10971 MD		10819.9	TVD	1979 FSL	689 FEL

Bot Perf/OH	ULSTR:	T (L)	01	T 21S	R 33E
15231 MD		15203.6	TVD	2365 FSL	365 FWL
					4915 FEL

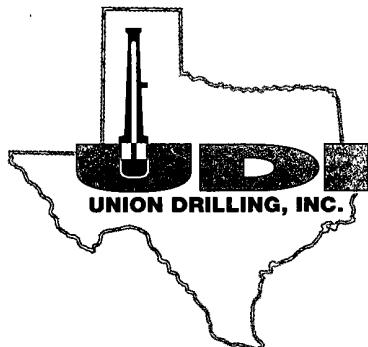
	MD	N/S	E/W	VD
	10931	-0.70	-327.80	10812.9
TOP PERFS/OH	10971	-1.30	-359.00	10819.90
	10971	-1.30	-359.00	10819.90
	15204	-26.20	-4558.10	10783.10
BOT PERFS/OH	15231	-27.32	-4585.06	10782.24
	15279	-29.30	-4633.00	10780.70

NEXT TO LAST	15204	-26.20	-4558.10	10783.10
LAST READING	15279	-29.30	-4633.00	10780.70
TD	15279	-29.30	-4633.00	10780.70

Surface Location	1980 FS	330 FE
Projected BHL	1951 FS	4963 FE
Location of		
Top Perfs/OH	1979 FS	689 FE
Bottom Perfs/OH	1953 FS	4915 FE

SUMMARY of Subsurface Locations

Surface Location	Q-01-21S-33E	1980 FS	330 FE	Vert. Depth
Top Perfs/OH	Q-01-21S-33E	1979 FS	689 FE	10819.90
Bottom Perfs/OH	T-01-21S-33E	1953 FS	4915 FE	10782.24
Projected TD	T-01-21S-33E	1951 FS	4963 FE	10780.70



COG OPERATING LLC
RECEIVED
MAY 09 2012
ARTESIA WEST

HOBBS OCD

JUN 13 2012

RECEIVED

Well Name & Number: Lightning P-38 State #3H

API Number: 30-025-40375

Location: 1980 FSL & 330 FEL, Lot I, Sec. 1, Township 21-S, Range 33-E, Lea County, New Mexico

Operator: COG Operating, LLC

SUR: Q-01-21s-33e, 1980/S & 330/E
BHL: T-01-21s-33e, 1951/S & 4963/E
API # 30-025-40375

Drilling Contractor: Union Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling Contractor who drilled the above described well and that deviation survey tests were conducted and he obtained the following results:

RECORD OF INCLINATION

*11 Measured Depth (feet)	12 Course Length (Hundreds of feet)	*13 Angle of Inclination (Degrees)	14. Displacement per Hundred Feet (Sine of Angle X100)	15 Course Displacement (feet)	16 Accumulative Displacement (feet)
319	319	.5	0.87	2.78	2.78
1189	870	.2	0.35	3.04	5.82
1988	799	.8	1.40	11.16	16.98
2940	952	1.8	3.14	29.91	46.88
3916	976	2.8	4.89	47.69	94.57
4774	858	1.8	3.14	26.95	121.53
5501	727	.3	0.52	3.81	125.34
6388	887	.8	1.40	12.38	137.72
6929	541	0	0.00	0.00	137.72
7727	798	1.2	2.09	16.71	154.43
8679	952	.5	0.87	8.31	162.74
9675	996	2.7	4.71	46.93	209.67
10576	901	2	3.49	31.45	241.12
11139	563	2.02	3.53	19.85	260.97
DIRECTIONAL					
TOOK OVER					

Drilling Contractor: Union Drilling, Inc.

By: Jim Mayfield
Jim Mayfield

Title: Division Manager

Subscribed and sworn to before me this 1ST Day of May, 2012.

Laura Jo Young
Notary Public

My Commission Expires: July 29, 2014

COUNTY OF TAYLOR)

)

STATE OF TEXAS)



COG OPERATING

Berry
Lea County, NM
Lightning P-38 State #3H
VH - Job #32K0312312

HOBBS OCD

JUN 13 2012

RECEIVED

SUR: Q-01-21s-33e, 1980/S & 330/E
BHL: T-01-21s-33e, 1951/S & 4963/E
API # 30-025-40375

Survey: Gyro

SDI Standard Survey Report

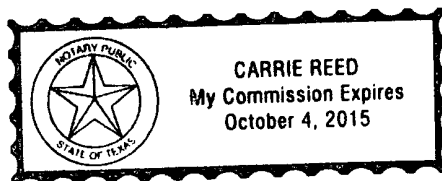
This survey is correct to the best of my knowledge and is supported by actual field data.

Hubert

Notarized this date 2nd of April, 2012.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Lightning P-38 State #3H
Project:	Berry	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Lightning P-38 State #3H	North Reference:	Grid
Wellbore:	VH - Job #32K0312312	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0312312	Database:	EDM-Regulatory

Project		Berry	
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site		Lea County, NM			
Site Position:		Northing:	558,260 79 usft	Latitude:	32° 31' 55 200 N
From:	Lat/Long	Easting:	757,138 31 usft	Longitude:	103° 29' 56 400 W
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0 45 °

Well	Lightning P-38 State #3H, Directional (Pathfinder)					
Well Position	+N/-S	0 0 usft	Northing:	548,392 79 usft	Latitude:	32° 30' 18 000 N
	+E/-W	0 0 usft	Easting:	751,357 56 usft	Longitude:	103° 31' 4 800 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	0 0 usft

Wellbore		VH - Job #32K0312312			
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/18/2012	7 49	60 44	48,742

Design		VH - Job #32K0312312			
Audit Notes:					
Version:		1 0	Phase:	ACTUAL	Tie On Depth: 0 0
Vertical Section:		Depth From (TVD)	+N/-S	+E/-W	Direction
		(usft)	(usft)	(usft)	(°)
		0 0	0 0	0 0	269 46

Survey Program		Date	4/10/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 0	11,700 0	Gyro (VH - Job #32K0312312)	Keeper	Keeper Gyro	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
0 0	0 00	0 00	0 0	0 0	0 0	0 00	0 0
100 0	0 73	290 95	100 0	0 2	-0 6	290 95	0 6
200 0	0 64	294 89	200 0	0 7	-1 7	292 15	1 8
300 0	0 72	299 74	300 0	1 2	-2 7	294 24	3 0
400 0	0 50	317 59	400 0	1 9	-3 6	297 54	4 0
500 0	0 39	335 73	500 0	2 5	-4 0	301 90	4 7
600 0	0 42	326 57	600 0	3 1	-4 4	305 56	5 4
700 0	0 32	331 87	700 0	3 7	-4 7	308 01	6 0
800 0	0 36	335 32	800 0	4 2	-5 0	310 28	6 5
900 0	0 22	345 60	900 0	4 7	-5 1	312 29	6 9
1,000 0	0 39	307 64	1,000 0	5 1	-5 5	312 89	7 4
1,100 0	0 46	273 15	1,100 0	5 3	-6 1	310 85	8 1

Scientific Drilling International, Inc.
SDI Standard Survey Report



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Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Lightning P-38 State #3H	North Reference:	Grid
Wellbore:	VH - Job #32K0312312	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0312312	Database:	EDM-Regulatory

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,200 0	0 52	265 21	1,200 0	5 3	-7 0	307 12	8 8
1,300 0	0 59	260 62	1,300 0	5 2	-7 9	303 02	9 5
1,400 0	0 79	263 62	1,399 9	5 0	-9 1	298 70	10 4
1,500 0	0 84	260 23	1,499 9	4 8	-10 5	294 48	11 6
1,600 0	0 88	261 13	1,599 9	4 6	-12 0	290 76	12 9
1,700 0	0 79	259 01	1,699 9	4 3	-13 5	287 75	14 1
1,800 0	0 72	266 71	1,799 9	4 1	-14 8	285 66	15 3
1,900 0	0 42	263 00	1,899 9	4 1	-15 8	284 45	16 3
2,000 0	0 39	63 65	1,999 9	4 2	-15 8	284 76	16 4
2,100 0	0 24	58 95	2,099 9	4 4	-15 3	286 10	16 0
2,200 0	0 40	51 15	2,199 9	4 8	-14 9	287 71	15 6
2,300 0	0 33	46 09	2,299 9	5 2	-14 4	289 75	15 3
2,400 0	0 39	48 31	2,399 9	5 6	-13 9	291 88	15 0
2,500 0	0 55	52 13	2,499 9	6 1	-13 3	294 70	14 6
2,600 0	0 66	48 63	2,599 9	6 8	-12 5	298 54	14 2
2,700 0	0 71	46 96	2,699 9	7 6	-11 6	303 20	13 9
2,800 0	0 82	48 04	2,799 9	8 5	-10 6	308 66	13 6
2,900 0	1 25	63 35	2,899 9	9 5	-9 1	316 08	13 1
3,000 0	1 82	73 23	2,999 8	10 4	-6 6	327 56	12 3
3,100 0	2 59	80 78	3,099 7	11 2	-2 9	345 68	11 6
3,200 0	3 03	82 36	3,199 6	11 9	2 0	9 42	12 1
3,300 0	3 14	79 19	3,299 5	12 8	7 3	29 65	14 7
3,400 0	3 23	76 60	3,399 3	14 0	12 7	42 31	18 9
3,500 0	3 18	76 48	3,499 2	15 3	18 2	49 92	23 7
3,600 0	3 12	76 13	3,599 0	16 6	23 5	54 79	28 8
3,700 0	3 15	76 72	3,698 9	17 9	28 8	58 20	33 9
3,800 0	2 56	86 53	3,798 7	18 6	33 7	61 08	38 5
3,900 0	2 63	88 54	3,898 6	18 8	38 2	63 79	42 6
4,000 0	2 21	93 90	3,998 5	18 8	42 5	66 17	46 4
4,100 0	2 01	94 63	4,098 5	18 5	46 1	68 17	49 7
4,200 0	2 01	94 67	4,198 4	18 2	49 6	69 87	52 9
4,300 0	1 61	86 86	4,298 4	18 1	52 8	71 04	55 8
4,400 0	1 63	84 39	4,398 3	18 3	55 6	71 74	58 5
4,500 0	1 33	71 80	4,498 3	18 8	58 1	72 03	61 1
4,600 0	1 48	50 69	4,598 3	20 0	60 2	71 60	63 5
4,700 0	2 02	59 94	4,698 2	21 7	62 7	70 90	66 4
4,800 0	1 79	50 87	4,798 2	23 6	65 5	70 18	69 6
4,900 0	1 48	41 65	4,898 1	25 5	67 5	69 28	72 2
5,000 0	1 24	38 59	4,998 1	27 4	69 1	68 40	74 3
5,100 0	1 23	40 24	5,098 1	29 0	70 4	67 61	76 2
5,200 0	1 12	40 32	5,198 1	30 6	71 8	66 92	78 0
5,300 0	0 81	45 11	5,298 0	31 8	72 9	66 41	79 6
5,400 0	0 46	43 49	5,398 0	32 6	73 7	66 12	80 6
5,500 0	0 35	34 46	5,498 0	33 2	74 1	65 90	81 2

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Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Lightning P-38 State #3H	North Reference:	Grid
Wellbore:	VH - Job #32K0312312	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0312312	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
5,600 0	0 34	3 60	5,598 0	33 7	74 3	65 60	81 6
5,700 0	0 36	325 23	5,698 0	34 3	74 2	65 20	81 7
5,800 0	0 39	316 55	5,798 0	34 8	73 7	64 76	81 5
5,900 0	0 45	297 14	5,898 0	35 2	73 2	64 31	81 2
6,000 0	0 40	284 25	5,998 0	35 5	72 5	63 93	80 7
6,100 0	0 43	296 00	6,098 0	35 7	71 8	63 56	80 2
6,200 0	0 44	298 44	6,198 0	36 1	71 1	63 12	79 7
6,300 0	0 43	291 65	6,298 0	36 4	70 4	62 69	79 3
6,400 0	0 43	276 00	6,398 0	36 6	69 7	62 33	78 7
6,500 0	0 33	256 23	6,498 0	36 5	69 1	62 13	78 1
6,600 0	0 28	262 14	6,598 0	36 4	68 5	62 01	77 6
6,700 0	0 24	277 23	6,698 0	36 4	68 1	61 86	77 2
6,800 0	0 23	241 55	6,798 0	36 4	67 7	61 77	76 9
6,900 0	0 31	233 56	6,898 0	36 1	67 3	61 80	76 4
7,000 0	0 41	224 50	6,998 0	35 7	66 8	61 91	75 8
7,100 0	0 74	207 93	7,098 0	34 9	66 3	62 27	74 9
7,200 0	1 08	206 03	7,198 0	33 4	65 6	62 99	73 6
7,300 0	1 32	207 51	7,298 0	31 6	64 6	63 97	71 9
7,400 0	1 44	199 83	7,397 9	29 4	63 7	65 24	70 1
7,500 0	1 56	196 70	7,497 9	26 9	62 9	66 85	68 4
7,600 0	1 59	197 37	7,597 9	24 2	62 1	68 65	66 6
7,700 0	1 55	198 73	7,697 8	21 6	61 2	70 52	64 9
7,800 0	1 47	204 12	7,797 8	19 2	60 2	72 33	63 2
7,900 0	1 42	202 13	7,897 8	16 9	59 3	74 10	61 6
8,000 0	1 41	203 95	7,997 7	14 6	58 3	75 94	60 1
8,100 0	1 42	200 00	8,097 7	12 3	57 4	77 88	58 7
8,200 0	1 37	195 63	8,197 7	10 0	56 6	79 99	57 5
8,300 0	1 37	193 24	8,297 6	7 7	56 0	82 19	56 5
8,400 0	1 35	197 42	8,397 6	5 4	55 4	84 44	55 7
8,500 0	1 36	196 65	8,497 6	3 1	54 7	86 72	54 8
8,600 0	1 05	197 99	8,597 6	1 1	54 1	88 81	54 1
8,700 0	0 81	194 49	8,697 5	-0 4	53 6	90 46	53 6
8,800 0	0 66	186 47	8,797 5	-1 7	53 4	91 81	53 4
8,900 0	0 29	130 26	8,897 5	-2 4	53 5	92 59	53 6
9,000 0	0 61	120 09	8,997 5	-2 9	54 2	93 01	54 2
9,100 0	0 45	113 51	9,097 5	-3 3	55 0	93 41	55 1
9,200 0	0 31	2 72	9,197 5	-3 2	55 4	93 27	55 4
9,300 0	0 76	343 41	9,297 5	-2 3	55 2	92 34	55 2
9,400 0	1 39	322 25	9,397 5	-0 7	54 2	90 70	54 3
9,500 0	2 51	301 87	9,497 4	1 5	51 6	88 39	51 7
9,600 0	3 34	308 28	9,597 3	4 4	47 5	84 69	47 7
9,700 0	2 99	314 98	9,697 2	8 1	43 4	79 47	44 1
9,800 0	2 72	328 90	9,797 0	11 9	40 3	73 50	42 0
9,900 0	1 96	338 31	9,897 0	15 6	38 4	67 96	41 5

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Lightning P-38 State #3H
Project:	Berry	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Lightning P-38 State #3H	North Reference:	Grid
Wellbore:	VH - Job #32K0312312	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0312312	Database:	EDM-Regulatory

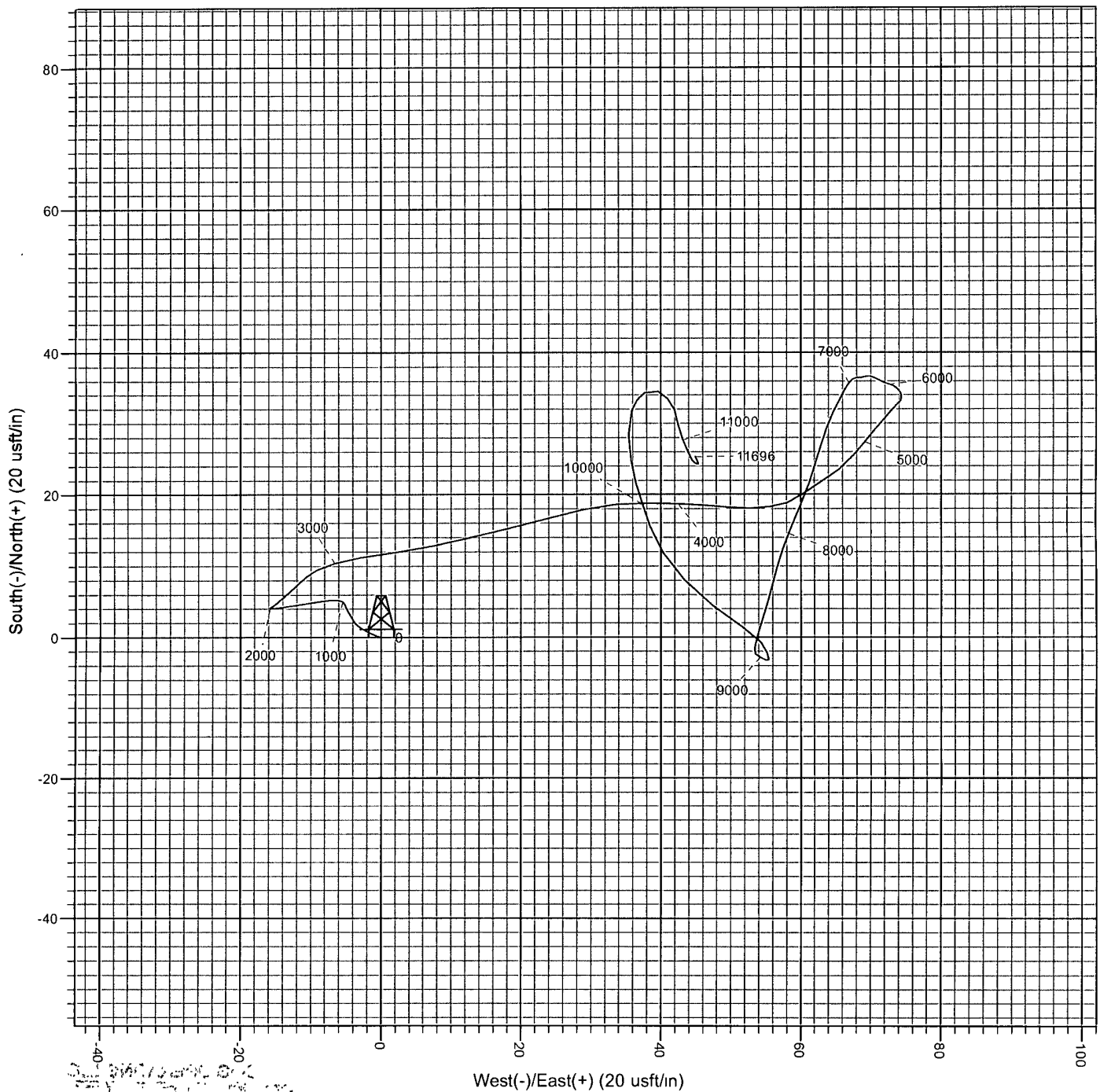
Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
10,000 0	1 79	342 36	9,996 9	18 6	37 3	63 47	41 7
10,100 0	1 77	343 40	10,096 8	21 6	36 4	59 32	42 3
10,200 0	2 02	351 46	10,196 8	24 8	35 7	55 19	43 5
10,300 0	2 04	355 90	10,296 7	28 3	35 3	51 26	45 3
10,400 0	2 07	20 09	10,396 7	31 8	35 8	48 39	47 9
10,500 0	1 60	58 77	10,496 6	34 2	37 6	47 71	50 9
10,600 0	1 06	126 19	10,596 6	34 4	39 6	48 99	52 4
10,700 0	0 95	126 10	10,696 6	33 4	41 0	50 84	52 9
10,800 0	1 20	165 03	10,796 6	31 9	41 9	52 75	52 7
10,900 0	1 33	166 68	10,896 5	29 7	42 5	55 00	51 8
11,000 0	1 10	156 40	10,996 5	27 7	43 1	57 26	51 3
11,100 0	1 12	156 78	11,096 5	26 0	43 9	59 40	51 0
11,200 0	0 41	144 59	11,196 5	24 8	44 5	60 90	50 9
11,300 0	0 24	119 48	11,296 5	24 4	44 9	61 50	51 1
11,400 0	0 12	90 27	11,396 5	24 3	45 2	61 75	51 3
11,500 0	0 06	63 35	11,496 5	24 3	45 3	61 81	51 4
11,600 0	0 10	336 76	11,596 5	24 4	45 3	61 71	51 5
11,700 0	1 08	338 08	11,696 5	25 3	44 9	60 58	51 6



Project: Berry
Lea County, NM
Well: Lightning P-38 State #3H
Wellbore: VH - Job #32K0312312
Design: VH - Job #32K0312312

WELL DETAILS: Lightning P-38 State #3H
WELL @ 0.0usft (Original Well Elev)
Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	548392.79	751357.56	32° 30' 18.000 N	103° 31' 4.800 W	



PROJECT DETAILS: Berry		SITE DETAILS: Lea County, NM	
Geodetic System: US State Plane 1927 (Exact solution)		Site Centre Latitude: 32° 31' 55.200 N	
Datum: NAD 1927 (NADCON CONUS)		Longitude: 103° 29' 56.400 W	
Ellipsoid: Clarke 1866		Positional Uncertainty: 0.0	
Zone: New Mexico East 3001		Convergence: 0.45	
System: Datum: Mean Sea Level		Local North: Grid	



COG Operating LLC

Lea County(NAD83)

Lightning P-38 Federal Com

#3H

ST#1

Design: ST#1

Pathfinder X & Y Report

27 April, 2012

PATHFINDER[®]

A Schlumberger Company



Pathfinder
Pathfinder X & Y Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County(NAD83)	TVD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	ST#1	Survey Calculation Method:	Minimum Curvature
Design:	ST#1	Database:	EDM 5000.1 Single User Db

Project		Lea County(NAD83)	
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site		Lightning P-38 Federal Com					
Site Position:		Northing:	547,398.720	usft	Latitude:	32.502	
From:	Map	Easting:	792,507.780	usft	Longitude:	-103.519	
Position Uncertainty:	0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	0.44
						°	

Well		#3H				
Well Position	+N/-S	0.0 usft	Northing:	548,778.750 usft	Latitude:	32.506
	+E/-W	0.0 usft	Easting:	792,497.170 usft	Longitude:	-103.519
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,752.4 usft

Wellbore		ST#1			
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	4/13/2012	7.47	60.46	48,745

Design		ST#1			
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	10,200.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	269.46	



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County(NAD83)	TVD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	ST#1	Survey Calculation Method:	Minimum Curvature
Design:	ST#1	Database:	EDM 5000.1 Single User Db

Survey Program		Date	4/27/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	10,200.0	Gyro #1 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
10,340.0	15,279.0	MWD #1 (ST#1)			

Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
	0.0	0.00	0.00	0.0	-3,773.4	0.0	0.0	0.0	0.00	548,778.75	792,497.17
	100.0	0.73	290.95	100.0	-3,673.4	0.2	-0.6	0.6	0.73	548,778.98	792,496.58
	200.0	0.64	294.89	200.0	-3,573.4	0.7	-1.7	1.7	0.10	548,779.44	792,495.47
	300.0	0.72	299.74	300.0	-3,473.4	1.2	-2.7	2.7	0.10	548,779.99	792,494.42
	400.0	0.50	317.59	400.0	-3,373.4	1.9	-3.6	3.6	0.29	548,780.62	792,493.58
	500.0	0.39	335.73	500.0	-3,273.4	2.5	-4.0	4.0	0.18	548,781.25	792,493.15
	600.0	0.42	326.57	600.0	-3,173.4	3.1	-4.4	4.3	0.07	548,781.87	792,492.81
	700.0	0.32	331.87	700.0	-3,073.4	3.7	-4.7	4.7	0.11	548,782.42	792,492.47
	800.0	0.36	335.32	800.0	-2,973.4	4.2	-5.0	4.9	0.04	548,782.95	792,492.21
	900.0	0.22	345.60	900.0	-2,873.4	4.7	-5.1	5.1	0.15	548,783.43	792,492.03
	1,000.0	0.39	307.64	1,000.0	-2,773.4	5.1	-5.5	5.4	0.26	548,783.82	792,491.71
	1,100.0	0.46	273.15	1,100.0	-2,673.4	5.3	-6.1	6.1	0.26	548,784.05	792,491.04
	1,200.0	0.52	265.21	1,200.0	-2,573.4	5.3	-7.0	6.9	0.09	548,784.03	792,490.19
	1,300.0	0.59	260.62	1,300.0	-2,473.4	5.2	-7.9	7.9	0.08	548,783.91	792,489.23
	1,400.0	0.79	263.62	1,399.9	-2,373.5	5.0	-9.1	9.1	0.20	548,783.75	792,488.04
	1,500.0	0.84	260.23	1,499.9	-2,273.5	4.8	-10.5	10.5	0.07	548,783.55	792,486.63
	1,600.0	0.88	261.13	1,599.9	-2,173.5	4.6	-12.0	12.0	0.04	548,783.31	792,485.15
	1,700.0	0.79	259.01	1,699.9	-2,073.5	4.3	-13.5	13.4	0.10	548,783.06	792,483.71
	1,800.0	0.72	266.71	1,799.9	-1,973.5	4.1	-14.8	14.7	0.12	548,782.89	792,482.41
	1,900.0	0.42	263.00	1,899.9	-1,873.5	4.1	-15.8	15.7	0.30	548,782.81	792,481.42
	2,000.0	0.39	63.65	1,999.9	-1,773.5	4.2	-15.8	15.8	0.80	548,782.92	792,481.36



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County(NAD83)	TVD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	ST#1	Survey Calculation Method:	Minimum Curvature
Design:	ST#1	Database:	EDM 5000.1 Single User Db

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,100.0	0.24	58.95	2,099.9	-1,673.5	4.4	-15.3	15.3	0.15	548,783.17	792,481.84
2,200.0	0.40	51.15	2,199.9	-1,573.5	4.8	-14.9	14.8	0.17	548,783.50	792,482.29
2,300.0	0.33	46.09	2,299.9	-1,473.5	5.2	-14.4	14.3	0.08	548,783.92	792,482.77
2,400.0	0.39	48.31	2,399.9	-1,373.5	5.6	-13.9	13.9	0.06	548,784.35	792,483.24
2,500.0	0.55	52.13	2,499.9	-1,273.5	6.1	-13.3	13.2	0.16	548,784.87	792,483.87
2,600.0	0.66	48.63	2,599.9	-1,173.5	6.8	-12.5	12.4	0.12	548,785.54	792,484.68
2,700.0	0.71	46.96	2,699.9	-1,073.5	7.6	-11.6	11.5	0.05	548,786.35	792,485.56
2,800.0	0.82	48.04	2,799.9	-973.5	8.5	-10.6	10.5	0.11	548,787.25	792,486.55
2,900.0	1.25	63.35	2,899.9	-873.5	9.5	-9.1	9.0	0.51	548,788.21	792,488.06
3,000.0	1.82	73.23	2,999.8	-773.6	10.4	-6.6	6.5	0.63	548,789.16	792,490.55
3,100.0	2.59	80.78	3,099.7	-673.7	11.2	-2.9	2.8	0.82	548,789.98	792,494.30
3,200.0	3.03	82.36	3,199.6	-573.8	11.9	2.0	-2.1	0.45	548,790.70	792,499.15
3,300.0	3.14	79.19	3,299.5	-473.9	12.8	7.3	-7.4	0.20	548,791.56	792,504.46
3,400.0	3.23	76.60	3,399.3	-374.1	14.0	12.7	-12.9	0.17	548,792.73	792,509.89
3,500.0	3.18	76.48	3,499.2	-274.2	15.3	18.2	-18.3	0.05	548,794.03	792,515.33
3,600.0	3.12	76.13	3,599.0	-174.4	16.6	23.5	-23.7	0.06	548,795.33	792,520.67
3,700.0	3.15	76.72	3,698.9	-74.5	17.9	28.8	-29.0	0.04	548,796.61	792,525.98
3,800.0	2.56	86.53	3,798.7	25.3	18.6	33.7	-33.9	0.76	548,797.38	792,530.89
3,900.0	2.63	88.54	3,898.6	125.2	18.8	38.2	-38.4	0.11	548,797.57	792,535.41
4,000.0	2.21	93.90	3,998.5	225.1	18.8	42.5	-42.6	0.48	548,797.50	792,539.63
4,100.0	2.01	94.63	4,098.5	325.1	18.5	46.1	-46.3	0.20	548,797.23	792,543.30
4,200.0	2.01	94.67	4,198.4	425.0	18.2	49.6	-49.8	0.00	548,796.94	792,546.80
4,300.0	1.61	86.86	4,298.4	525.0	18.1	52.8	-52.9	0.47	548,796.88	792,549.95
4,400.0	1.63	84.39	4,398.3	624.9	18.3	55.6	-55.8	0.07	548,797.09	792,552.76
4,500.0	1.33	71.80	4,498.3	724.9	18.8	58.1	-58.3	0.44	548,797.59	792,555.28
4,600.0	1.48	50.69	4,598.3	824.9	20.0	60.2	-60.4	0.54	548,798.78	792,557.38
4,700.0	2.02	59.94	4,698.2	924.8	21.7	62.7	-62.9	0.61	548,800.48	792,559.91



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County(NAD83)	TVD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	ST#1	Survey Calculation Method:	Minimum Curvature
Design:	ST#1	Database:	EDM 5000.1 Single User Db

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
4,800.0	1.79	50.87	4,798.2	1,024.8	23.6	65.5	-65.7	0.38	548,802.34	792,562.65	
4,900.0	1.48	41.65	4,898.1	1,124.7	25.5	67.5	-67.8	0.41	548,804.30	792,564.71	
5,000.0	1.24	38.59	4,998.1	1,224.7	27.4	69.1	-69.3	0.25	548,806.11	792,566.25	
5,100.0	1.23	40.24	5,098.1	1,324.7	29.0	70.4	-70.7	0.04	548,807.77	792,567.62	
5,200.0	1.12	40.32	5,198.1	1,424.7	30.6	71.8	-72.1	0.11	548,809.34	792,568.94	
5,300.0	0.81	45.11	5,298.0	1,524.6	31.8	72.9	-73.2	0.32	548,810.58	792,570.08	
5,400.0	0.46	43.49	5,398.0	1,624.6	32.6	73.7	-74.0	0.35	548,811.37	792,570.85	
5,500.0	0.35	34.46	5,498.0	1,724.6	33.2	74.1	-74.4	0.13	548,811.91	792,571.30	
5,600.0	0.34	3.60	5,598.0	1,824.6	33.7	74.3	-74.6	0.18	548,812.46	792,571.49	
5,700.0	0.36	325.23	5,698.0	1,924.6	34.3	74.2	-74.5	0.23	548,813.01	792,571.33	
5,800.0	0.39	316.55	5,798.0	2,024.6	34.8	73.7	-74.1	0.06	548,813.52	792,570.92	
5,900.0	0.45	297.14	5,898.0	2,124.6	35.2	73.2	-73.5	0.15	548,813.95	792,570.34	
6,000.0	0.40	284.25	5,998.0	2,224.6	35.5	72.5	-72.8	0.11	548,814.21	792,569.65	
6,100.0	0.43	296.00	6,098.0	2,324.6	35.7	71.8	-72.1	0.09	548,814.46	792,568.97	
6,200.0	0.44	298.44	6,198.0	2,424.6	36.1	71.1	-71.5	0.02	548,814.81	792,568.30	
6,300.0	0.43	291.65	6,298.0	2,524.6	36.4	70.4	-70.8	0.05	548,815.13	792,567.61	
6,400.0	0.43	276.00	6,398.0	2,624.6	36.6	69.7	-70.1	0.12	548,815.31	792,566.89	
6,500.0	0.33	256.23	6,498.0	2,724.6	36.5	69.1	-69.4	0.16	548,815.28	792,566.24	
6,600.0	0.28	262.14	6,598.0	2,824.6	36.4	68.5	-68.9	0.06	548,815.18	792,565.71	
6,700.0	0.24	277.23	6,698.0	2,924.6	36.4	68.1	-68.4	0.08	548,815.17	792,565.26	
6,800.0	0.23	241.55	6,798.0	3,024.6	36.4	67.7	-68.1	0.14	548,815.10	792,564.88	
6,900.0	0.31	233.56	6,898.0	3,124.6	36.1	67.3	-67.7	0.09	548,814.84	792,564.49	
7,000.0	0.41	224.50	6,998.0	3,224.6	35.7	66.8	-67.2	0.11	548,814.43	792,564.02	
7,100.0	0.74	207.93	7,098.0	3,324.6	34.9	66.3	-66.6	0.37	548,813.60	792,563.46	
7,200.0	1.08	206.03	7,198.0	3,424.6	33.4	65.6	-65.9	0.34	548,812.19	792,562.75	
7,300.0	1.32	207.51	7,298.0	3,524.6	31.6	64.6	-64.9	0.24	548,810.32	792,561.80	
7,400.0	1.44	199.83	7,397.9	3,624.5	29.4	63.7	-63.9	0.22	548,808.11	792,560.84	



Pathfinder
Pathfinder X & Y Report

PATHFINDER
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Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	ST#1	Survey Calculation Method:	Minimum Curvature
Design:	ST#1	Database:	EDM 5000.1 Single User Db

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
7,500.0	1.56	196.70	7,497.9	3,724.5	26.9	62.9	-63.1	0.15	548,805.63	792,560.03	
7,600.0	1.59	197.37	7,597.9	3,824.5	24.2	62.1	-62.3	0.04	548,803.00	792,559.22	
7,700.0	1.55	198.73	7,697.8	3,924.4	21.6	61.2	-61.4	0.05	548,800.39	792,558.37	
7,800.0	1.47	204.12	7,797.8	4,024.4	19.2	60.2	-60.4	0.16	548,797.94	792,557.41	
7,900.0	1.42	202.13	7,897.8	4,124.4	16.9	59.3	-59.4	0.07	548,795.62	792,556.42	
8,000.0	1.41	203.95	7,997.7	4,224.3	14.6	58.3	-58.4	0.05	548,793.35	792,555.46	
8,100.0	1.42	200.00	8,097.7	4,324.3	12.3	57.4	-57.5	0.10	548,791.06	792,554.53	
8,200.0	1.37	195.63	8,197.7	4,424.3	10.0	56.6	-56.7	0.12	548,788.75	792,553.79	
8,300.0	1.37	193.24	8,297.6	4,524.2	7.7	56.0	-56.1	0.06	548,786.43	792,553.19	
8,400.0	1.35	197.42	8,397.6	4,624.2	5.4	55.4	-55.4	0.10	548,784.15	792,552.57	
8,500.0	1.36	196.65	8,497.6	4,724.2	3.1	54.7	-54.7	0.02	548,781.88	792,551.87	
8,600.0	1.05	197.99	8,597.6	4,824.2	1.1	54.1	-54.1	0.31	548,779.88	792,551.25	
8,700.0	0.81	194.49	8,697.5	4,924.1	-0.4	53.6	-53.6	0.25	548,778.32	792,550.79	
8,800.0	0.66	186.47	8,797.5	5,024.1	-1.7	53.4	-53.4	0.18	548,777.06	792,550.55	
8,900.0	0.29	130.26	8,897.5	5,124.1	-2.4	53.5	-53.5	0.55	548,776.33	792,550.68	
9,000.0	0.61	120.09	8,997.5	5,224.1	-2.9	54.2	-54.1	0.33	548,775.90	792,551.33	
9,100.0	0.45	113.51	9,097.5	5,324.1	-3.3	55.0	-54.9	0.17	548,775.47	792,552.15	
9,200.0	0.31	2.72	9,197.5	5,424.1	-3.2	55.4	-55.3	0.63	548,775.59	792,552.52	
9,300.0	0.76	343.41	9,297.5	5,524.1	-2.3	55.2	-55.2	0.48	548,776.49	792,552.35	
9,400.0	1.39	322.25	9,397.5	5,624.1	-0.7	54.2	-54.2	0.73	548,778.09	792,551.42	
9,500.0	2.51	301.87	9,497.4	5,724.0	1.5	51.6	-51.7	1.30	548,780.20	792,548.81	
9,600.0	3.34	308.28	9,597.3	5,823.9	4.4	47.5	-47.5	0.89	548,783.16	792,544.67	
9,700.0	2.99	314.98	9,697.2	5,923.8	8.1	43.4	-43.4	0.51	548,786.81	792,540.54	
9,800.0	2.72	328.90	9,797.0	6,023.6	11.9	40.3	-40.4	0.74	548,790.69	792,537.47	
9,900.0	1.96	338.31	9,897.0	6,123.6	15.6	38.4	-38.6	0.85	548,794.31	792,535.61	
10,000.0	1.79	342.36	9,996.9	6,223.5	18.6	37.3	-37.5	0.22	548,797.39	792,534.50	
10,100.0	1.77	343.40	10,096.8	6,323.4	21.6	36.4	-36.6	0.04	548,800.35	792,533.59	



Pathfinder
Pathfinder X & Y Report

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Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
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Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
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Design:	ST#1	Database:	EDM 5000.1 Single User Db

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
10,200.0	2.02	351.46	10,196.8	6,423.4	24.8	35.7	-35.9	0.36	548,803.58	792,532.88	
KOP - 10200.0 'MD, 10196.8 'TVD, 351.46 'AZI, 2.02 'INC, 24.8 'N, 35.7 'E											
10,340.0	9.06	271.33	10,336.2	6,562.8	27.5	24.3	-24.6	6.38	548,806.28	792,521.48	
10,371.0	9.50	267.54	10,366.8	6,593.4	27.5	19.3	-19.6	2.43	548,806.23	792,516.48	
10,403.0	9.58	266.57	10,398.3	6,624.9	27.2	14.0	-14.3	0.56	548,805.95	792,511.18	
10,434.0	13.19	262.57	10,428.7	6,655.3	26.6	7.9	-8.2	11.91	548,805.34	792,505.10	
10,466.0	16.62	263.03	10,459.6	6,686.2	25.6	-0.2	0.0	10.73	548,804.31	792,496.93	
10,498.0	19.70	264.34	10,490.0	6,716.6	24.5	-10.1	9.9	9.71	548,803.23	792,487.02	
10,529.0	22.42	264.90	10,518.9	6,745.5	23.4	-21.2	21.0	8.80	548,802.18	792,475.93	
10,561.0	24.53	264.82	10,548.3	6,774.9	22.3	-33.9	33.7	6.59	548,801.04	792,463.24	
10,592.0	27.35	265.09	10,576.2	6,802.8	21.1	-47.4	47.2	9.10	548,799.85	792,449.73	
10,624.0	30.60	264.47	10,604.2	6,830.8	19.7	-62.9	62.7	10.20	548,798.44	792,434.30	
10,655.0	33.50	263.86	10,630.4	6,857.0	18.0	-79.2	79.1	9.41	548,796.76	792,417.93	
10,687.0	37.28	264.65	10,656.5	6,883.1	16.2	-97.7	97.5	11.90	548,794.91	792,399.50	
10,719.0	40.98	265.35	10,681.3	6,907.9	14.4	-117.8	117.6	11.64	548,793.16	792,379.38	
10,750.0	45.11	265.44	10,704.0	6,930.6	12.7	-138.9	138.7	13.32	548,791.46	792,358.29	
10,782.0	49.42	265.35	10,725.7	6,952.3	10.8	-162.3	162.2	13.47	548,789.57	792,334.87	
10,813.0	53.73	265.05	10,745.0	6,971.6	8.8	-186.5	186.4	13.92	548,787.54	792,310.68	
10,845.0	58.04	265.17	10,762.9	6,989.5	6.5	-212.9	212.8	13.47	548,785.28	792,284.29	
10,876.0	62.52	265.09	10,778.3	7,004.9	4.2	-239.7	239.7	14.45	548,783.00	792,257.47	
10,908.0	66.48	266.05	10,792.0	7,018.6	2.0	-268.5	268.5	12.67	548,780.77	792,228.68	
10,939.0	70.61	267.46	10,803.4	7,030.0	0.4	-297.3	297.3	13.98	548,779.14	792,199.88	
10,971.0	74.92	268.52	10,812.9	7,039.5	-0.7	-327.8	327.8	13.84	548,778.07	792,169.34	
11,003.0	79.49	269.31	10,819.9	7,046.5	-1.3	-359.0	359.0	14.48	548,777.48	792,138.15	
11,097.0	90.04	269.26	10,828.5	7,055.1	-2.4	-452.5	452.5	11.22	548,776.32	792,044.68	
LP - 11097.0 'MD, 10828.5 'TVD, 269.26 'AZI, 90.04 'INC, -2.4 'N, -452.5 'E											
11,192.0	90.75	269.48	10,827.9	7,054.5	-3.5	-547.5	547.5	0.78	548,775.27	791,949.69	



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County(NAD83)	TVD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Site:	Lightning P-38 Federal Com	MD Reference:	KB = 21' @ 3773.4usft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	ST#1	Survey Calculation Method:	Minimum Curvature
Design:	ST#1	Database:	EDM 5000.1 Single User Db

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
11,286.0	90.75	269.26	10,826.6	7,053.2	-4.5	-641.5	641.5	0.23	548,774.24	791,855.71
11,381.0	90.40	268.79	10,825.7	7,052.3	-6.1	-736.4	736.5	0.62	548,772.62	791,760.72
11,476.0	90.57	268.36	10,824.9	7,051.5	-8.5	-831.4	831.5	0.49	548,770.26	791,665.76
11,571.0	90.66	268.03	10,823.8	7,050.4	-11.5	-926.4	926.4	0.36	548,767.27	791,570.81
11,665.0	91.10	267.62	10,822.4	7,049.0	-15.0	-1,020.3	1,020.4	0.64	548,763.70	791,476.89
11,760.0	91.45	267.62	10,820.3	7,046.9	-19.0	-1,115.2	1,115.3	0.37	548,759.76	791,381.99
11,855.0	91.98	267.45	10,817.4	7,044.0	-23.1	-1,210.0	1,210.2	0.59	548,755.67	791,287.13
11,950.0	92.33	267.50	10,813.9	7,040.5	-27.3	-1,304.9	1,305.1	0.37	548,751.49	791,192.29
12,045.0	91.71	268.84	10,810.5	7,037.1	-30.3	-1,399.8	1,400.0	1.55	548,748.46	791,097.40
12,139.0	91.89	269.14	10,807.6	7,034.2	-31.9	-1,493.7	1,493.9	0.37	548,746.80	791,003.46
12,234.0	91.28	270.03	10,804.9	7,031.5	-32.6	-1,588.7	1,588.9	1.14	548,746.12	790,908.50
12,329.0	91.36	270.11	10,802.8	7,029.4	-32.5	-1,683.6	1,683.9	0.12	548,746.23	790,813.52
12,423.0	89.96	270.43	10,801.7	7,028.3	-32.1	-1,777.6	1,777.9	1.53	548,746.68	790,719.53
12,518.0	90.04	270.28	10,801.7	7,028.3	-31.5	-1,872.6	1,872.9	0.18	548,747.26	790,624.53
12,613.0	90.48	270.16	10,801.2	7,027.8	-31.1	-1,967.6	1,967.8	0.48	548,747.63	790,529.54
12,708.0	90.92	269.58	10,800.1	7,026.7	-31.3	-2,062.6	2,062.8	0.77	548,747.41	790,434.54
12,803.0	91.10	269.17	10,798.4	7,025.0	-32.4	-2,157.6	2,157.8	0.47	548,746.38	790,339.56
12,898.0	90.48	270.28	10,797.1	7,023.7	-32.8	-2,252.6	2,252.8	1.34	548,745.92	790,244.58
12,992.0	90.48	270.26	10,796.3	7,022.9	-32.4	-2,346.6	2,346.8	0.02	548,746.36	790,150.58
13,087.0	90.84	270.05	10,795.2	7,021.8	-32.1	-2,441.6	2,441.8	0.44	548,746.62	790,055.59
13,182.0	91.19	269.69	10,793.5	7,020.1	-32.3	-2,536.6	2,536.8	0.53	548,746.41	789,960.60
13,277.0	90.92	270.37	10,791.8	7,018.4	-32.3	-2,631.6	2,631.7	0.77	548,746.46	789,865.62
13,372.0	89.96	271.14	10,791.0	7,017.6	-31.0	-2,726.5	2,726.7	1.30	548,747.71	789,770.63
13,466.0	90.22	271.06	10,790.9	7,017.5	-29.2	-2,820.5	2,820.7	0.29	548,749.51	789,676.65
13,561.0	90.92	270.82	10,790.0	7,016.6	-27.7	-2,915.5	2,915.6	0.78	548,751.07	789,581.67
13,656.0	89.87	270.81	10,789.3	7,015.9	-26.3	-3,010.5	3,010.6	1.11	548,752.42	789,486.68
13,751.0	90.22	270.93	10,789.2	7,015.8	-24.9	-3,105.5	3,105.6	0.39	548,753.86	789,391.69



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Lea County(NAD83)
Site: Lightning P-38 Federal Com
Well: #3H
Wellbore: ST#1
Design: ST#1

Local Co-ordinate Reference: Well #3H
TVD Reference: KB = 21' @ 3773.4usft (Original Well Elev)
MD Reference: KB = 21' @ 3773.4usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
13,845.0	89.16	271.36	10,789.7	7,016.3	-23.0	-3,199.5	3,199.5	1.22	548,755.74	789,297.71
13,940.0	89.60	271.58	10,790.8	7,017.4	-20.6	-3,294.4	3,294.5	0.52	548,758.18	789,202.75
14,035.0	90.04	271.56	10,791.1	7,017.7	-18.0	-3,389.4	3,389.4	0.46	548,760.78	789,107.79
14,129.0	90.75	271.34	10,790.4	7,017.0	-15.6	-3,483.3	3,483.3	0.79	548,763.16	789,013.82
14,224.0	89.78	270.80	10,790.0	7,016.6	-13.8	-3,578.3	3,578.3	1.17	548,764.93	788,918.84
14,319.0	90.13	270.50	10,790.0	7,016.6	-12.7	-3,673.3	3,673.3	0.49	548,766.01	788,823.85
14,414.0	90.57	270.20	10,789.5	7,016.1	-12.2	-3,768.3	3,768.3	0.56	548,766.59	788,728.85
14,508.0	90.04	269.57	10,789.0	7,015.6	-12.3	-3,862.3	3,862.3	0.88	548,766.40	788,634.85
14,603.0	90.40	268.87	10,788.6	7,015.2	-13.6	-3,957.3	3,957.3	0.83	548,765.11	788,539.86
14,698.0	89.52	269.00	10,788.7	7,015.3	-15.4	-4,052.3	4,052.3	0.94	548,763.34	788,444.88
14,793.0	89.87	269.61	10,789.2	7,015.8	-16.6	-4,147.3	4,147.3	0.74	548,762.19	788,349.89
14,888.0	90.31	269.26	10,789.0	7,015.6	-17.5	-4,242.3	4,242.3	0.59	548,761.26	788,254.89
14,982.0	90.84	268.87	10,788.1	7,014.7	-19.0	-4,336.3	4,336.2	0.70	548,759.72	788,160.91
15,077.0	91.19	268.16	10,786.4	7,013.0	-21.5	-4,431.2	4,431.2	0.83	548,757.26	788,065.96
15,204.0	91.80	267.59	10,783.1	7,009.7	-26.2	-4,558.1	4,558.1	0.66	548,752.55	787,939.09
15,279.0	91.80	267.59	10,780.7	7,007.3	-29.3	-4,633.0	4,633.0	0.00	548,749.40	787,864.19

BHL - 15279.0 'MD, 10780.7 'TVD, 267.59 'AZI, 91.80 'INC, -29.3 'N, -4633.0 'E

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,200.0	10,196.8	24.8	35.7	KOP - 10200.0 'MD, 10196.8 'TVD, 351.46 'AZI, 2.02 'INC, 24.8 'N, 35.7 'E
11,097.0	10,828.5	-2.4	-452.5	LP - 11097.0 'MD, 10828.5 'TVD, 269.26 'AZI, 90.04 'INC, -2.4 'N, -452.5 'E
15,279.0	10,780.7	-29.3	-4,633.0	BHL - 15279.0 'MD, 10780.7 'TVD, 267.59 'AZI, 91.80 'INC, -29.3 'N, -4633.0 'E

Checked By: _____

Approved By: _____

Date: _____